

**EXPERIMENTAL EVALUATION OF RC BEAM GRADE 30  
UNDER DYNAMIC INFLUENCE OF SERVICEABILITY LIMIT**

By

**ROSLI BIN NGAH**

Report is submitted as  
the requirement for the degree of  
**B. Eng (Hons) (Civil)**

**UNIVERSITI TEKNOLOGI MARA  
MARCH 2005**

**DECLARATION BY THE CANDIDATE**

I Rosli bin Ngah, 2002366756 confirm that the work is my own and that appropriate credit has been given where reference has been made to the work of others.

.....  
(Rosli bin Ngah)

## **ABSTRACT**

In the design of reinforced concrete structures, serviceability limit must be satisfied to ensure safety. Serviceability refers to control deflection and cracks width at services loads. Subjected to dynamic loading under static and dynamic load, a study has been carried out to make an experimental investigation on reinforced concrete beam grade 30, with respect to the serviceability limits. A total 4 beam has been cast and test under static and dynamic load. 1 000 000, 2 000 000 and 3 000 000 cycle has been used as for 5 Hertz loading. Parameters investigated include deflections, crack widths and crack lengths. It is expected that the cracking at reinforced concrete beam. The maximum crack width that may be considered to be acceptable in a given situation depends on the type of reinforced concrete beam, the environment and the consequences of excessive cracking.

## **TABLE OF CONTENTS**

<b>CONTENT</b>	<b>PAGE</b>
DECLARATIONS	
ACKNOWLEDGEMENT	i
LIST OF FIGURES	vi
LIST OF TABLES	viii
LIST OF ABBREVIATIONS	ix
LIST OF APPENDIX	x
ABSTRACT	xi
1 CHAPTER 1 – INTRODUCTION	
1.1 Introduction	1
1.2 Problem Statement	1
1.3 Objectives of the Study	2
1.4 Scope of Work	2
2. CHAPTER 2 – LITERATURE REVIEW	
2.1 Introduction	3
2.2 Reinforced concrete	4
2.3 Serviceability Limit State	4
2.4 Dynamic Load Distribution	5
2.4.1 Static Load	5
2.4.2 Dynamic Load	6
2.5 Cracking in Reinforced Concrete	7
2.5.1 Plastic Shrinkage Cracking	8
2.5.2 Flexural Cracking	8

	2.5.3	Mechanism of Flexural Cracking	9
	2.5.4	Method for Computing Crack Width	10
2.6		Deflection of Reinforced Concrete	11
	2.6.1	Behaviour of Flexural Member under Deflection	12
	2.6.2	Method for Computing Deflection	12
2.7		Concrete Mix Design	13
	2.7.1	Concrete	13
	2.7.2	Concrete Admixture	14
	2.7.3	Effect of Chemical Admixtures on Concrete	
		Proportions	15
	2.7.3.1	Workability of the Fresh Concrete	15
	2.7.3.2	The Compressive Strength of Concrete	15
	2.7.3.3	Durability of Concrete	16
	2.7.3.4	Consistency	17
2.8		Design Consideration	17
2.9		Design of Reinforced Concrete Beam	18
3		CHAPTER 3 – RESEARCH METHODOLOGY	
	3.1	Experiment Setup	20
	3.2	The Mix Design Process and Materials	21
	3.2.1	Cement	21
	3.2.2	Water	22
	3.2.3	Aggregates	22
	3.2.4	High Yield and Mild Steel Bars	23
	3.3	Preparation of Specimens	23
	3.4	Experiment Procedure	24
	3.4.1	Position and Calculation of Strain Rosette	24